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BYR-3000-63
Copy 1 of 4

21 July 1963

Job 70B-00572R
Box #1 Folder #2

MEMORANDUM FOR: THE RECORD

SUBJECT: Factors Affecting A-12 Flight Test and Mach Number Extension

1. There have been 285 A-12 flights since April, 1962, accumulating 397 total flight hours. The highest speed accomplished is Mach 3.06 at 72,000 feet. Comparing this Mach number with these total hours reveals a 0.008 average Mach number increase per flight hour. In addition to the recognized fact that flights with two J-58 engines (necessary for Mach number extension) were not initiated until 15 January 1963 and did not begin to accumulate many hours until March, 1963, the following list is incorporated to present those factors of an unusual and perhaps less recognized nature which have delayed the program since March, 1963:

- a. Foreign object damage which resulted in 18 engine removals and extensive aircraft nacelle modifications suspended all Mach number extension flights between 5 April and 17 May 1963.
- b. Bad weather during April, May and June accounted for approximately twenty-two flight cancellations involving aircraft #121 and #122 (assigned to Mach number extension and flight test).
- c. Aircraft #123 accident occurred 24 May, 1963, and as a result all aircraft were grounded for approximately one week. In addition to this, effort was diverted from the flight program during the accident investigation. Mach number extension flights with aircraft #121 and #122 were not resumed until 12 June.
- d. Engine #223 suffered a bearing failure on 14 June which resulted in eight engine removals for bearing inspection and re-test prior to re-installation. All J-58 equipped aircraft were grounded 26 June for this inspection. Mach number extension flights were resumed 2 July.
- e. Aircraft turn around time between flights and preparation for flight of newly delivered aircraft has appeared excessive. Personnel numbers and shift scheduling has been discussed with Mr. C.L. Johnson.
- f. Top level direction of the flight test effort has appeared deficient in the areas of instrumentation planning and coordination between Lockheed flight test and Lockheed project engineering and between Lockheed and Pratt and Whitney. Headquarters has requested that Mr. Johnson personally direct the flight test effort for an extended period. [] Assistant Chief Engineer of Pratt and Whitney also has been requested and is scheduled to pay extended visits to the test site starting this week.

2. There have been 22 A-12 flights (with two J-58 engines installed) devoted to Mach number extension. These flights have accumulated 17 hours and have attained a Mach number of 3.06 at 72,000 feet. (See attachments #1 and #2). Comparing this Mach number with these hours reveals a 0.18 average Mach number increase per flight hour. Flight test practice limits each extension flight to about 0.20 Mach number above the previous flight for general safety and aircraft stability investigation reasons. In addition to this limitation, the following list presents three areas of existing technical problems which are recognized as the type normally encountered and which require some time and effort for their resolution thereby inflicting a delaying influence:

a. Meaningful aircraft/engine airflow matching can be accomplished only during instrumented A-12 flight with two fully rated J-58 engines installed and with fully automatic operating aircraft inlets. The first flight satisfying all of the above requirements was flight #72 of aircraft #121 on 17 July. Inter-related factors involved in this matching problem are aircraft roughness and drag, inlet controls, ejector, engine rotor speed and turbine temperature, main fuel control, and air flow distribution and distortion. With the exception of aircraft roughness about which little is known at this time, these factors are becoming well defined by appropriate instrumentation and substantially improved by corrective actions.

b. Aircraft problems involve fuel and hydraulic leaks, false fire warnings and malfunctions of instrumentation, drag chute, electrical system, stability system and the inertial navigational system. These are not uncommon to other programs yet they represent a delaying influence.

c. Engine problems involve afterburner liners, afterburner flameholders, plumbing, excessive oil consumption and investigation and establishment of inflight relight capability. These again are not uncommon to other programs. Corrective Actions are underway and preliminary interim fixes have been expedited to the test site. They are not now holding up the program but because in several instances engine removals have been required a delaying influence was inflicted. Final resolution of the oil consumption and afterburner liner problems is being pursued concurrently in the Pratt and Whitney development program in Florida.

3. Not yet experienced but nonetheless anticipated will be those problems attendant with sustained flight at high Mach number and altitude where extreme ambient temperatures will be attained.

Attachments: 2

Chief, Aircraft Systems Division
OSA/DDR

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ATT # 1 TO
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A-12 AIRCRAFT #121

A. First flight with two J-58 engines: 9 March 1963.

B. Recapitulation of test-flights devoted to speed-extension since 9 March 1963:

<u>Flt Nbr.</u>	<u>Date</u>	<u>Flt Time</u>	<u>Mach Nbr.</u>
56	12 March	39 Min.	2.16
57	18 March	44 "	2.49
58	26 March	15 "	-
59	27 March	46 "	2.53
60	5 April	56 "	2.45
65	22 May	50 "	2.45
67	19 June	47 "	2.51
68	20 June	41 "	2.6
69	2 July	44 "	2.62
70	10 July	44 "	2.72
71	12 July	50 "	2.18
72	17 July	56 "	2.82
73	20 July	53 "	3.06

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ATT # 2 TO
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A-12 Aircraft #122

A. First flight with two J-58 engines: 15 January 1963.

B. Recapitulation of test-flights devoted to speed-extension since 15 January 1963:

<u>Flt Nbr.</u>	<u>Date</u>	<u>Flt Time</u>	<u>Mach Nbr.</u>
3	8 February	56 Min.	2.24
4	1 March	41 "	2.24
5	5 March	56 "	2.35
6	8 March	34 "	2.45
7	19 March	52 "	2.28
9	27 March	56 "	2.35
15	21 June	46 "	2.2
17	11 July	43 "	2.25
18	17 July	41 "	2.6
19	19 July	abort	-

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NUMBER OF FLIGHT HOURS AT OR ABOVE VARIOUS
MACH NUMBERS

100-10000-2062

<u>MACH NO.</u>	<u>NO. OF FLTS.</u>	<u>TOTAL TIME-HRS:MIN.</u>
Above 1.5	47	10:58
Above 2.0	25	4:45
Above 2.5	8	0:36
Above 3.0	1	0:01

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